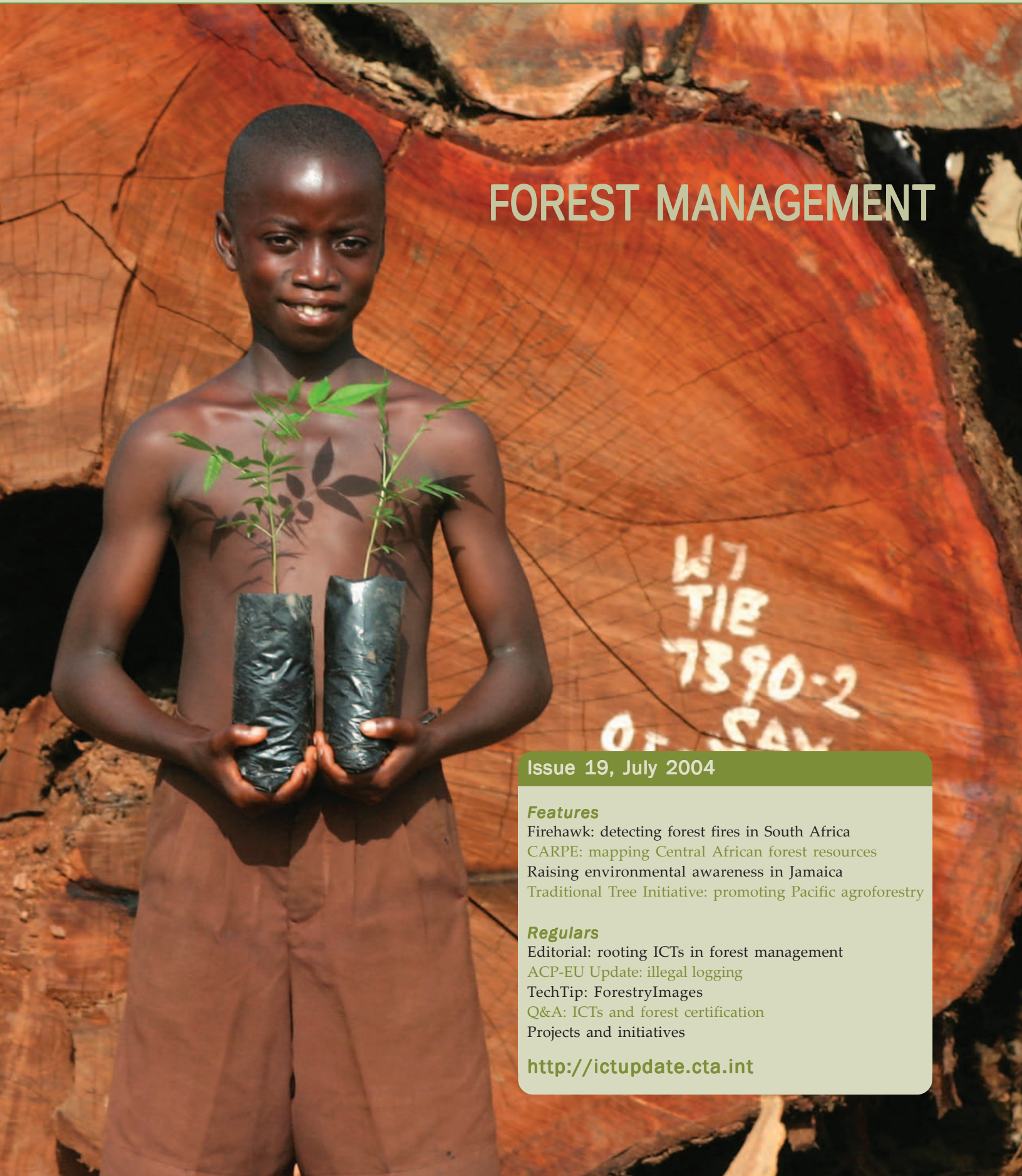
ICT Update
A current awareness bulletin for ACP agriculture

CTA



FOREST MANAGEMENT

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Rooting ICTs in forest management

Theodore Roosevelt once said that 'to exist as a nation, to prosper as a state and to live as people, we must have trees'. His words still reverberate more than half a century later, as the world struggles to manage its forests in a manner that is both sustainable and profitable. The main issue facing forestry policy makers today is uncontrolled deforestation, resulting in soil erosion, desertification, biodiversity loss and the ensuing socio-economic upheavals.

Sustainable forest management is of particular relevance to ACP countries because about half of all forests are located in tropical areas. The rate of forest clearance is increasing – in some countries due to the ever-growing need for farmland, and in others to forest fires started by illegal loggers to meet the demand for hardwood. In recognition of these problems, many developing countries are putting in place policies and plans to promote sustainable forest management. This issue of *ICT Update* reports on some recent initiatives in which ICTs have made significant contributions.

ICTs are being applied to two key areas of forest management – in mapping and monitoring of forest resources and environmental threats, and in raising awareness of the need for sustainable forestry practices. A prime example of the former is Firehawk, an electronic forest fire detection system that has replaced manned lookout towers in plantations in KwaZulu Natal. Jake Oosthuizen describes how the system has improved the detection of fires, thus reducing the damage to the environment and the timber industry.

Deirdre Smith explains how the CARPE project is using satellite-derived maps of the Congo Basin to assist African policy makers in identifying which areas of the forest and plant or animal species are under threat from illegal logging, cultivation and other human activities. The maps could prove invaluable in the design of policies for sustainable forest resources management in Central Africa.

Susie Latham reports on the Trees for Tomorrow project in Jamaica, where the Forestry Department is using a GIS database to identify areas at risk, which are then set aside as protected national forest reserves. In addition, the project's Forest Awareness Campaign aims to gain public support for the sustainable management of forests and watersheds through information centres, a website and educational videos.

Awareness raising is also the focus of the Traditional Tree Initiative, an effort to reacquaint Pacific islanders with local tree species. Craig Elevitch describes how the project is compiling a series of fact sheets on CD-ROM that will record the all but forgotten knowledge of the region's native tree species and promote the re-adoption of traditional agroforestry systems.

Finally, Zandra Martinez explains how the Forest Stewardship Council is increasingly using ICTs to support its forest certification system, a labelling scheme to assure consumers that the wood products they buy come from sustainably managed forests.

The destruction of forests in ACP countries has direct impacts on the lives of people around the world – our collective future depends upon the state of forest resources. As the initiatives described in this issue clearly demonstrate, ICTs are playing an increasingly important role in ensuring the sustainable management of the world's forests.

Illegal logging

Illegal logging is a pervasive problem that causes enormous damage to forests, local communities and national economies. The EU is one of the largest markets for timber and forest products, but has virtually no legal means of preventing illegal imports. EU-level actions against illegal logging, such as they are, have been included in the European Commission's Action Plan on Forest Law Enforcement, Governance and Trade (FLEGT)[1], presented in May 2003. The aim of the Action Plan is to control the import of illegally sourced timber by developing bilateral or regional partnership agreements in order to create a caucus of the main wood-producing and importing countries. The agreements will stipulate that timber imports from partner countries must be harvested in conformity with their national legislation, before they can be imported into the EU. In order to control the import, the Commission must draft a regulation that will form the legal basis for a voluntary licensing scheme.

As a first step towards such a system, the European Council adopted the Action Plan in October 2003. However, the Commission and the Council recognize that a significant number of producer countries are unlikely to enter into partnership agreements, and that illegal timber traders will import illegally sourced forest products via third countries that have no such agreements with the EU. The Council has therefore asked the Commission to review the options for – and the feasibility of – further legislation to control imports of illegally harvested timber.

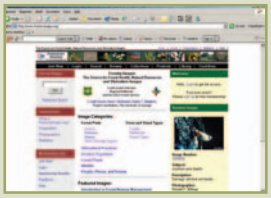
In reviewing further legislation, the Commission should note that illegal forest use is not just an outcome of poor governance but is often an integral part of local and national political economies. Revenues from illegal forest exploitation often serve to perpetuate existing political parties, policies and practices. There is a clear danger that EU efforts to curb illegal logging will unwittingly encourage national governments to water down their existing environmental laws rather than strengthen them. This could lead governments to weaken existing forest laws, or even to legalize currently illegal logging practices, in order to satisfy the EU. It is therefore essential to start a political dialogue with producer countries focusing not only on illegal forestry practices but also on forest sector reform, increasing transparency, strengthening land tenure and access rights, and reducing corruption.

EU Member States have been asked to enter into discussions with producer countries and to report back to the Council by mid-2004 on their readiness for, and their views on, partnership agreements. Their reports will form the basis for future debate on the Commission's mandate to negotiate with interested partner countries. Moreover, the Council has asked the Commission to draft, also by mid-2004, a regulation setting up a voluntary licensing scheme for identifying legal timber and wood products as part of the partnership agreements.

[1] *http://europa.eu.int/comm/development/body/theme/forest/initiative/index_en.htm*

Saskia Ozinga (email: *saskia@fern.org*) is coordinator at FERN (Forests and the European Union Resource Network). For further information, visit *www.fern.org*.

TechTip: ForestryImages



ForestryImages.org is a collaborative endeavour between **Bugwood Network** and the **USDA Forest Service**. The site contains over 4500 photographs and illustrations of more than 800 insects, diseases, pests, plants, wildlife, and management practices. Most images were digitized from high-resolution 35 mm slides. *www.ForestryImages.org/*

Firehawk: detecting forest fires in South Africa

Jake Oosthuizen describes how Firehawk, an electronic forest fire detection system, is reducing the damage caused by fire in KwaZulu Natal.

At 6:45 a.m. on what promises to be a sweltering August day, Zululand Fire Protection Services (ZFPS) operations manager Trevor Wilson has just been alerted to a nascent fire in a pine plantation 12 kilometres away. One of his monitors shows high-resolution video images of smoke building up in the area. Trevor zooms in to take a closer look and, with the help of his computer's software, quickly determines the exact location of the fire.

Time is of the essence. He immediately dispatches aerial firefighters – bomber aircraft that will release a large load of flame-retardant water above the area in order to smother the fire and prevent it from spreading. Within 30 minutes the situation is under control again.

Trevor works at the Kwambonambi Operations Centre, the main firefighting command post in KwaZulu Natal's coastal zone. The area, which covers 88,000 hectares of timber, is one of the focal points of the South African forestry industry. ZFPS, a commercial enterprise, is responsible for protecting this vast fire-prone area. Only a few years ago ZFPS firefighters were almost helpless against fires that could be fanned by winds raging at 100 kilometres per hour with flames shooting 50 to 100 metres into the sky. By the time ground crews stationed in lookout towers reported a fire it was usually already too late. To complicate matters, they were often unable to identify the exact location of the fire and thus the closest access roads.

The Firehawk system comprises eleven digital video cameras mounted on tall masts. Photo: ZFPS

ZFPS management realized that to prevent such catastrophes they needed a surveillance system that could detect a fire as soon as it starts. They therefore introduced Firehawk, an ingenious electronic forest fire detection system with a network of cameras replacing the manned lookout towers. Originally developed by Digital Imaging Systems, a South African technology company, ZFPS took ownership of Firehawk in 2001. Since then, the average area affected by fire each year has been reduced, and so has the financial cost to plantation owners.

'Now that we have the capability to detect fires more rapidly, ground crews and aerial support are able to get to the source of fires much faster,' says Trevor. 'This has drastically limited the damage, both to the environment and the timber industry'.

Incoming images are analyzed by software that can distinguish between fire, smoke and glow. Photos: ZFPS

How Firehawk works

The Firehawk system consists of a network of eleven digital video cameras mounted on masts up to 72 metres high. The cameras record live video images of their surrounding area, completing a full 360° scan in less than four minutes. Each camera covers a radius of 6 to 8 kilometres but, visibility permitting, can detect a fire up to 20 kilometres away.

The live video images are transmitted via microwave antennae to the Kwambonambi Operations Centre, which can be up to 65 kilometres away. There, the images are analyzed by sophisticated Firehawk software that can distinguish between fire, smoke and glow, and automatically raises an alarm.

What makes the Firehawk system so valuable is its highly interactive nature – ZFPS operators are not required to wait passively for incoming information. Each Firehawk camera is equipped with a radio receiver that allows the operator to manipulate it remotely without affecting other cameras in the system. Thus, using the video control panel, the operator can pan and tilt each camera in any direction and zoom in on any area of concern. Moreover, the Firehawk software is linked to a geographic information system (GIS) database that provides operators with additional information about the area under surveillance. For example, at the touch of a button, any fire can be cross-referenced from different cameras to determine its exact coordinates. The GIS maps are also used to identify the fastest or safest road to access the fire. Last but not least, the GIS database is continuously updated and can be used to make predictions about areas that are most at risk from fire.

Firehawk's future looks promising. The system is being extended to other South African regions as forestry companies and private plantation owners come to realize its enormous potential. The system effectively provides fire fighting forces with 'eyes' everywhere and allows them to respond to fires more quickly and effectively than ever before.

Jake Oosthuizen (*zfps@iafrica.com*) is the founder of Zululand Fire Protection Services. For further information, visit *www.zfps.co.za*

CARPE: mapping Central African forest resources by satellite

Deirdre Smith explains how the CARPE project is using satellite-derived maps to identify areas of the forest under threat from logging, cultivation and other human activities.

Satellite technology has led to amazing breakthroughs in mapping the most impenetrable areas of the world. In the Democratic Republic of Congo, for example, cartographer Jean-Robert Bwangoy-Bankanza is compiling a new tropical forest zoning map of the Mai-Ndombe region. The map consists of high-resolution satellite images that have been combined with geographic information system (GIS) data sets containing information on the vegetation as well as socio-economic data. In its final version, the map will assist local policy makers in identifying which forest areas and plant and animal species are under threat from logging, cultivation and other human activities. It may thus prove invaluable in the design of sustainable forest resources management plans.

Bwangoy-Bankanza's project is part of the Central African Regional Program for the Environment (CARPE), a long-term project of USAID and the international Congo Basin Forest Partnership (CBFP) to address the issues of deforestation and biodiversity loss in the Congo Basin, a tropical forest area second in size only to the Amazon Basin. A consortium of government and NGO partners, CARPE aims to ensure that African decision makers have access to, and the capacity to use, information critical to natural resources management (NRM). To a large extent, this information comes in the form of Landsat satellite-derived maps that can be continuously updated using geospatial databases.

Why maps matter

CARPE's maps clearly show the intricate relations between the forest resources of the Congo Basin and the local communities that depend on them. As visual representations of ecological and economic threats, the maps are a powerful tool to engage local NGOs, individuals and government agencies in NRM. The maps are fundamental to CARPE's activities because the Congo Basin remains, to a large extent, *terra incognita*. The area hosts the richest ecosystems in tropical Africa; so far, 11,000 higher plant species have been identified, as well as more than 450 mammal and nearly 1000 bird species. However, very little is known about distributions of plant and animal species, and how they have been affected by the area's 20 million human inhabitants, who depend directly on natural resources for their livelihoods. Unsustainable logging, mining, shifting cultivation and other problems related to poverty and political instability are posing increasing threats to this globally significant tropical forest.

Using satellite images, together with data gathered on the ground, CARPE staff are slowly filling in the gaps and, with the help of local communities, gaining a comprehensive picture of the Congo Basin. CARPE has started providing stakeholders, including members of fishing communities and farmers' associations as well as NRM professionals, with training in skills such as the creation and use of geospatial data. Eventually, CARPE's zoning maps will provide information to assist policy makers in establishing a network of national parks and protected areas. Moreover, the maps, when taken together, will support the creation of a regional legal framework for rational NRM and anti-poaching laws. In the future they may also be used to promote sustainable agriculture and ecotourism programmes.

A GIS map of Central Africa

Project highlights

Recent success stories include the work of GIS professional Didier Bokelo-Bile for the CARPE/CBFP project in the swampy Maringa/Lopori-Wamba region. Using a detailed, composite satellite image of the landscape, Bokelo-Bile is identifying and digitizing the location of rivers, roads and villages, and is preparing a regional vegetation map. His data sets will be entered into a geospatial database, which CARPE/CBFP intends to use in planning and coordinating the activities of its various partners working in the region.

Elsewhere in the Congo Basin, an elephant telemetry project is tracking elephants tagged with Global Positioning System (GPS) collars via satellite. The project combines spatial data, based on remote sensing technology, with statistics on elephant densities and distribution as well as demographic information. Researchers can then generate maps indicating the number and density of elephant herds in relation to their distance from roads and villages, for example. As elephants are indicators of the health of the entire forest ecosystem, this information could be widely useful.

Meanwhile, Mano Ntayingi-Mwamur is working on health issues with both CARPE and Santé Rurale (SANRU), a USAID-funded rural health project. Many forest communities are at serious risk from preventable diseases such as malaria and cholera, which are more likely to occur in areas affected by migration, deforestation, flooding or extreme weather. Thus, Ntayingi-Mwamur recently mapped the administrative boundaries of health services in the DRC. He added epidemiological data to the map and entered them into a geospatial database, together with satellite-derived data on regional forest cover and river networks. This has enabled him to generate 'risk maps' showing where environmental factors may cause epidemics. His findings will allow public health policy makers to develop policies and programmes that focus their limited resources on areas of the forest where the health threats are greatest.

Sustainable management of the forest resources of the Congo Basin will benefit not only the people and countries of the region, but the entire global community. Through its mapping activities, CARPE hopes that its efforts to conserve the forests will help to slow down global climate change and the loss of species and genetic resources that are of universal value.

Deirdre Smith (*dsmith@hermes.geog.umd.edu*) is a multimedia officer at CARPE. For further information, visit *http://carpe.umd.edu* and *www.cbfp.org*

Trees for Tomorrow: raising environmental awareness in Jamaica

Susie Latham describes how the Jamaican Forestry Department has adopted a wide range of ICTs in its efforts to restore and protect the island's forests.

'A little axe can cut down a big tree' goes a well known Jamaican saying. It aptly describes the historical processes that have slowly eroded the island's forest cover. Once called 'the land of wood and water' by its original Taino inhabitants, Jamaica's landscape underwent a massive change after the arrival of European settlers, who felled much of the forest for agricultural production. Even forest lands on hillsides and mountain slopes were cleared for growing crops. The forestry authorities are now grappling with the consequences of centuries of improper land use, including major environmental problems such as soil erosion, destruction of wildlife, and reduced river flows. Better land management is urgently needed to prevent further damage to the island's forest resources.

The Forestry Department of the Ministry of Agriculture has recognized that, in order to raise awareness of the need for sustainable forest management, it will have to fight the battle on two fronts – within the government and among ordinary Jamaicans, farmers in particular. Thus, the Trees for Tomorrow (TFT) project was launched which is turning foresters into geographic information system (GIS) experts and video camera-wielding extension officers.

The TFT project, sponsored by the Canadian International Development Agency (CIDA) and the government of Jamaica, is the Forestry Department's most important effort to win the hearts and minds of Jamaicans. Initiated in 1992, one of its main concerns is to gather accurate and reliable data on the extent of forest cover and the exact location of forest boundaries, and how these have changed over time, in order to support national and local forestry plans.

One of the project's major achievements has been the creation of a GIS database that includes an inventory of forest lands and aerial photographs of the entire island. With this database, Forestry Department members can analyze land use patterns and identify areas that are under serious environmental threat. These areas may then be nominated for inclusion on the list of protected national reserves. The GIS also contains survey data on existing forest reserve boundaries, and the extent of encroachment, recorded by staff using Global Positioning System (GPS) devices.

The TFT members' surveying efforts have proven remarkably effective. Based on their GIS analyses the government strengthened its commitment to keep aside a significant proportion of the island as forest reserves. The island's forest reserves occupy more than 111,000 hectares, or over 10% of the area of the island. Using TFT survey data, the Forestry Department is in the process of establishing a detailed forest protection system and a plan for patrolling these reserves.

Forest Awareness Campaign

Another component of the TFT project is the Forest Awareness Campaign, which was launched in 1998. The campaign aims to gain public support for the sustainable management of forests and watersheds, through exhibitions, information centres at agricultural shows, a website and educational broadcasts on national TV. As part of this initiative, the Department's foresters and wardens have received training in a variety of extension techniques. Equipped with video cameras, overhead projectors and an array of informative posters, calendars and brochures, they now give talks at community meetings and organize training and work days for farmers. During these events, they provide farmers with free tree seedlings and technical advice on, for example, farm woodlots, agroforestry systems and soil conservation. A parallel schools programme aims at delivering forest protection and management messages to children of all ages.

Their talks are enlivened by a series of educational videos. One example is the 'Forest Watch' series, which features, in a news programme format, interviews with 'forest heroes' – ordinary people who are doing a good job in the forestry sector. So far, these heroes have included a hill farmer who discusses soil conservation; the coordinator of an NGO who is developing a bamboo craft centre; and a landowner who has set aside part of his land as a sustainable pine plantation.

Participants in a TFT agroforestry demonstration day

The interest of local communities in the Forest Awareness Campaign's agenda has led to the formation of three local forest management committees which provide the Forestry Department with feedback on its management of the forest reserves. Another measure of the success of the public awareness programme has been the positive response of the private sector to the Forestry Department's appeal to join in the effort to restore and protect the island's forests.

The Trees for Tomorrow project has made a significant contribution to sustainable forest management in Jamaica. It has also helped the Forestry Department to improve its performance, capacity and credibility. Its innovative application of ICTs and environmental awareness raising techniques will benefit the country for years to come.

Susie Latham (email: *slatham@forestry.gov.jm*) is an agriculture economist and TFT member. For further information, visit *www.forestry.gov.jm*

Traditional Tree Initiative: promoting Pacific agroforestry

Craig Elevitch describes how a series of fact sheets on CD-ROM is reacquainting Pacific islanders with local tree species.

Mr Embi, a cash crop farmer in eastern Papua New Guinea, has just received a CD-ROM containing some valuable information from an extension officer. Seated in front of his computer, he loads the CD and begins reading through a series of fact sheets describing indigenous trees. One particular fact sheet catches his attention – it describes *Canarium indicum*, a nut tree known locally as the *galip*. Although previously unaware of the tree's many benefits, Mr Embi is most interested in its lucrative intercropping possibilities – the *galip* can provide rapid returns if it is grown in the same field as bananas, papaya or kava. Best of all, the tree is indigenous to Papua New Guinea. Intercropping it with compatible local plants will encourage biodiversity by providing habitats for a variety of useful insects and soil organisms that are usually absent in a single-crop environment.

This scenario may soon become commonplace as Agroforestry.net, a non-profit educational organization, launches its Traditional Tree Initiative, with the support of the US Department of Agriculture's Western Region Sustainable Agriculture Research and Education (WSARE) programme and the SPC/GTZ Pacific-German Regional Forestry Project.

When complete, the series of 50 fact sheets will cover the most important tree species indigenous to the South Pacific. Each sheet will provide detailed, practical information on tree products and their uses, intercropping applications, growing requirements and propagation methods (see box).

The fact sheets will be freely available on the Internet and on searchable CD-ROM, with hyperlinks to 200 agricultural offices, libraries and schools in the region. They will therefore serve two overlapping goals: to record, in a single collection, the nearly forgotten knowledge about the region's native tree species, and to promote the re-adoption of traditional agroforestry systems throughout the South Pacific.

Filling the knowledge gap

The Traditional Tree Initiative fact sheets come not a moment too soon – Pacific island tree species have, regrettably, been ignored and underutilized for decades. Pacific islanders were among the most self-sufficient and well-nourished peoples in the world, and had built up their agricultural systems around a diverse base of native tree species. Since colonial times, however, traditional agroforestry systems have been cut down and replaced with plantation and cash crops, so that knowledge of local tree species and their many applications has all but disappeared.

Most of the professional literature neglects traditional agroforestry trees, focusing instead on a narrow range of exotic species, many of which are untested in the region, and are difficult to acquire. They could also pose serious threats to island ecosystems in that they are potentially invasive. Nonetheless, farmers have turned away from reliable, 'time-tested' native species in favour of exotics, perhaps because information about them is more widely available.

While being aware of the existence of traditional trees is one thing, knowing how to use them is quite another. Even farmers who are aware of the economic benefits of integrating native trees into their farming systems may fail to recognize the ecological advantages. For example, a farmer may decide to use a local tree species to diversify his crops but may not know that it can also be useful for pest management, soil improvement, water conservation, windbreaks or livestock fodder.

The Traditional Tree Initiative fact sheets aim to address all of these issues. After surveying agricultural professionals throughout the region, Agroforestry.net decided that fact sheets would be the most appropriate format. The organization asked a group of regional experts to identify the 50 most important underutilized tree species through an email voting process. Leading authorities on traditional and native Pacific island species are currently compiling the species profiles. A panel of 35 academics, producers and other professionals will review their work in the coming months.

Even though the project is still in its early stages, the demand for information about traditional trees is clear. When a pre-release version of one species profile (*Morinda citrifolia*) was posted on the Agroforestry.net website in October 2003 it was downloaded by more than 14,000 visitors in just six months.

Other species profiles will be released as they are finalized, with an expected completion date of June 2005. Together the fact sheets will create a valuable reference work that may help to restore traditional agroforestry systems that will stand the test of time.

Craig Elevitch (*cre@agroforestry.net*) is an agroforestry specialist. For further information, visit *http://agroforestry.net/tti/index.html*

Excerpt from the fact sheet for the *Canarium* tree

***Canarium indicum* L.;**
Burseraceae (Torchwood family)

Common names: *canarium nut* (English), *galip nut* (pidgin, Papua New Guinea), *nangai* (Vanuatu), *ngali*, *ngali nut* (Solomon Islands)

Distribution: Native to eastern Indonesia, Papua New Guinea, Solomon Islands and Vanuatu

Size: Typically 20–30 m tall with canopy diameter of 15–20 m at maturity

Habitat: Lowland, sub-humid to humid tropics, very warm temperatures throughout the year, elevation 0–600 m, annual rainfall 1800–4000 mm

Vegetation: Widely planted around villages and settlements

Soils: Favours medium to heavy-textured soils of moderate to high fertility

Growth rate: Slow during the first year, 0.6–2 m, but grows rapidly thereafter, often 2.5–3 m/yr for next 5–6 years, on good sites.

Main agroforestry uses: Homegarden, windbreak, mixed woodlot

Main products: Nuts, timber, traditional medicine

Yields: The annual yield of nuts from 1 ha of canarium nut is estimated to commence in Year 7 at about 750 kg edible kernel

Projects and initiatives

This section lists key projects and initiatives in the field of forest management and ICTs. Additional information is available from the web magazine at *http://ictupdate.cta.int*

AFRICA

The **Integrated Forest Monitoring System (INFORMS) for Central Africa** project, funded by the **NASA Land-Cover and Land-Use Change (LCLUC)** programme and implemented by the University of Maryland, is creating digital maps detailing forest types, extent, spatial distribution, biomass and usage in Central Africa in order to develop a regional forest monitoring system. Team members are integrating multiple satellite image data and extensive field measurements into a GIS database that can be used to assess the impact of agriculture and logging on forests in the region.
http://luci.umd.edu/lcluc/

Central Africa: The **Conservation and Rational Use of Forest Ecosystems in Central Africa (ECOFAC)** is a regional EU programme to create and manage protected areas that act as sanctuaries of biodiversity. ECOFAC operates in traditional societies in remote settings lacking any infrastructure or services, and produces or supports a variety of information media – cartoons, plays, radio programmes, printed teaching materials and a website – to raise awareness of the programme's objectives and to establish dialogue with local forest inhabitants. The EU is funding the acquisition of radar images of all the sites, since they can be obtained regardless of cloud cover over areas of moist tropical rainforest. The images are used to develop up-to-date topographical and vegetation maps. *www.ecofac.org*

South Africa: The **Southern African Fire Network (SAFNet)** is a regional network that fosters collaborative efforts in fire monitoring and management in southern Africa. As part of the **Global Observation for Forest and Land Cover Dynamics (GOFC/GOLD)** programme, SAFNet uses remote sensing and other satellite-based geospatial information to detect forest fires, to map and quantify areas affected by fires and to improve the quality of estimates of greenhouse gas emissions from fires. The network also provides an online forum on fire-related issues and disseminates information, data and best practices for field observations. *http://safnet.umd.edu/overview/index.asp*

CARIBBEAN

Guyana: The **Iwokrama International Centre for Rain Forest Conservation and Development** is an independent non-profit institution that manages the Iwokrama Forest, which covers 1 million acres in central Guyana, to show how tropical forests can be conserved and sustainably used for ecological, social and economic benefits. The geographic information system (GIS) team has developed a decision support system for forest management, using spatial modelling and satellite remote sensing techniques to identify forest resources, predict seasonal flooding and devise forest zoning plans. *www.iwokrama.org/research/gis.htm*

Suriname: The **Centre for Agricultural Research in Suriname (CELOS)** gathers and compiles information upon which long term or strategic land-use decisions can be made. Its **Department of Forestry Research** and **Department of Natural Resources and Environmental Assessment (NARENA)** use the **CELOS Forest Management System (CMS)**, which integrates remote sensing data and digital photographs of forest areas into a GIS database to analyze the effects of environmental processes and agricultural and logging activities on rainforest ecosystems. The CMS is also used to classify areas by vegetation/forest type for conservation or commercial purposes. *www.celos.sr.org/*

ASIA & THE PACIFIC

Agroforestry Net, Inc. is a non-profit organization that develops educational resources on agroforestry, trees, and sustainable stewardship of land and water in the Asia-Pacific region. The website offers access to various services: archives of **The Overstory**, a bimonthly email journal with subscribers in over 170 countries; the **Traditional Tree Initiative**, which produces Species Profiles for Pacific Island Agroforestry, a series of fact sheets about native tree species (see left); **Agroforestry Guides for the Pacific Islands**, a series of publications for extension officers, supported by the USDA-Western Sustainable Agriculture Research and Extension (WSARE); and the **Agroforester's Library**, containing resources for agroforestry experts worldwide.
http://agroforestry.net

The **South Pacific Regional Initiative on Forest Genetic Resources (SPRIG) Phase II** is an AusAID-funded project intended to help conserve, improve and promote the use of the genetic resources of important regional tree species. SPRIG II will focus on the development of local germplasm (seed orchards and clone banks) and demonstration plantings of priority tree species, including sandalwood, mahogany and malili. Genetic data on regional tree species and updates on the tree planting activities will be collected in a database and distributed by email.
www.ausaid.gov.au/projects/sprig_pacific.cfm

The **Southeast Asia Fire Danger Rating System Project**, implemented by the **Canadian Forest Service (CFS)**, is developing a forecasting tool that measures the risk of wildfires starting and spreading, for the meteorological agencies of Brunei, Indonesia, Malaysia and Singapore. Fire danger rating is the process of systematically evaluating the individual and combined factors influencing fire danger. Forecasts are based on daily satellite meteorological observations, which are modified by GIS analyses of vegetation as potential fuel.
http://nofc.cfs.nrcan.gc.ca/seasia

GLOBAL

The **World Agroforestry Centre (formerly ICRAF)** focuses on the development of agroforestry systems that will help to restore soil fertility, regenerate degraded lands, and enhance watershed protection, biodiversity conservation, and carbon sequestration. The website includes various databases: including the **Agroforestree Database**, the **Tree Seed Suppliers' Directory**, **Prunus Net** and **Marula Net** (Prunus africana and Sclerocarya birrea), and **LeucNet** (Leucaena). The Centre's GIS and remote sensing lab offers online training for researchers involved in creating a national spatial data infrastructure, focusing on the use of GIS data for planning, and to demonstrate the applicability of GIS/RS technology in natural resources management throughout East Africa.
www.worldagroforestrycentre.org/

The **Bugwood Work Group** gathers, creates, maintains, distributes and promotes the use of digital information to enhance and complement information exchange and educational activities in the fields of forestry and forest health. The network has produced an extensive collection of online resources for the forestry and entomology communities, including more than 6500 high-resolution digital images of tree species and tree pests and a library of fact sheets, newsletters and publications.
www.bugwood.org/

Q&A: ICTs and forest certification

Forest certification is a relatively new means of promoting sustainable forest management. The most widely used certification system is managed by the **Forest Stewardship Council (FSC)** in Bonn, Germany. **Zandra Martinez** explains how the FSC is using ICTs to support its activities.

What are the core activities of the FSC?
The FSC is an international non-profit organization that was founded in 1993 to introduce an international forest certification scheme and to act as an accreditation body. Forest certification is the process of inspecting particular forests or woodland to see if they are being managed according to an agreed set of strict ecological, economic and social criteria or standards. The FSC does not itself certify forest operations or manufacturers. These important activities are carried out by independent, FSC-accredited certification bodies in more than 30 countries.

An important component of forest certification is product or chain-of-custody (CoC) verification. CoC is the process through which the source of a timber product is verified. In order to qualify for the FSC trademark, timber products must be traceable from the forest through all the steps in the production process until they reach the end user. The FSC provides producers with international labelling standards to facilitate this process. Over the past few decades, CoC labelling processes have greatly benefited from ICTs.

How have CoC methods evolved?
The oldest methods of wood labelling involved painting or chiselling company information and ID numbers onto a tree, or on one or both ends of a log. Such labels are commonly used in conjunction with paper records on tree or log species, dimensions and volume. More recently, ICTs are providing increasingly sophisticated means of labelling, as well as more efficient tools for tracking and storing additional information about timber products.

The first major technological leap was the bar-coded label. Bar-coded data can be instantly read by a handheld scanner, stored electronically and transferred to a computer for analyses of stock inventories, for example. Bar-coded labels are increasingly being used to identify individual logs, particularly in countries that export high-value logs, and it is important to capture export revenues.

Another key development has been the emergence of labels containing radio frequency identification (RFID) transceivers that receive and transmit data by radio signals. A handheld scanner can instruct any RFID label to transmit its data through a coded signal. The scanner may then be plugged into a computer and the data downloaded for further analysis. An important advantage of RFID systems for log tracking is that the data signals can be read rapidly, remotely and under difficult conditions. Also, RFID labels can store a large amount of data with a high level of security – they are difficult to counterfeit or tamper with. The tags come in a variety of forms, including plastic cards and tiny injectable transponders.

On the down side, available radio frequencies vary from country to country, so there are currently no internationally standardized RFID technologies. What's more, RFID labels are still too expensive for labelling individual logs and processed bundles of wood.

What advanced technologies are now being used to capture data?
CoC systems require careful documentation and record keeping, including files related to stock inventories and inspections, transport documentation, and retail and distribution records. The forestry industry has developed extensive databases to manage these records more effectively.

Also, Global Positioning System (GPS) technology has had a major impact on this aspect of the CoC. GPS is commonly used in forest inventories to delineate the boundaries of forested areas and to determine field locations, but can also be used to track shipments of logs and timber products and to provide estimated delivery times.

Microchip cards, or 'smart cards', and magnetic strip cards are also very useful. These pieces of plastic can store large amounts of data and have built-in security features – they are ideal replacements for paper records and make the logistics of tracking timber products much more efficient.

RFID labels. Photo: RFID Journal

Finally, how is the FSC using ICTs to disseminate information?
As an international network, the FSC relies on electronic communication to reach its 500 members and 33 national offices, in addition to annual face-to-face meetings. The FSC provides information in both Spanish and English to reach its stakeholders in the South, and has recently launched a new website and intranet. All relevant new developments are announced in the monthly FSC email newsletter *News+Notes*, which is sent to more than 4000 subscribers around the world.

Moreover, the FSC has set up a hotline to answer questions, and has created a number of web-based forums so that stakeholders can more easily exchange information regarding the Council's policies, consultations and other issues related to forest management. Taken together, these initiatives form part of a concerted, ongoing effort on the part of the FSC to increase awareness of the many benefits of forest certification – now and in the future.

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